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**MEDITERRANEAN CINGULOPSIDAE, A RELICT EASTERN TETHYAN
FAUNA (GASTROPODA: CINGULOPSOIDEA) (**)**

KEY WORDS: Gastropoda, Cingulopsidae, Mediterranean Sea.

Abstract:

Examination of the radula and opercula of Mediterranean cingulopsids has shown that three genus-group taxa are represented in the Mediterranean Sea, *Eatonina* s.s. and its subgenus *Eatonina* (*Coriandria*), as well as the aglossate genus *Tubbreva*. *Eatonina* s.s. and *Tubbreva* have not been previously recorded outside Australasia and the Indo-west Pacific. The distribution of these species suggests a relict eastern Tethyan distribution.

Riassunto

Dall'esame della radula e dell'opercolo di Cingulopsidae del Mediterraneo risulta che in questo mare sono presenti tre taxa generici o sottogenerici, e cioè, oltre a *Eatonina* s.s. e *Eatonina* (*Coriandria*), anche il genere *Tubbreva*, che è privo di radula. *Eatonina* s.s. e *Tubbreva* erano sinora state segnalate solo per l'Australasia e l'Indopacifico occidentale. Questa distribuzione discontinua fa supporre che le specie appartenenti a questi generi, viventi attualmente in Mediterraneo, siano popolazioni relitte risalenti alla Tetide orientale.

Introduction

The family name Cingulopsidae was erected for the European species «*Cingulopsis*» [= *Eatonina* (*Coriandria*)] *fulgida* (J. ADAMS) by FRETTER & PATIL (1958), and has been included in the «Rissoacea» (= Truncatelloidea, see Ponder, 1988) but a separate superfamily, Cingulopsoidea, for the Cingulopsidae + Eatoniellidae + Rastodentidae has recently been advocated (PONDER, 1988). Cingulopsids are now known to occur mainly in Australasia (PONDER, 1965; PONDER & Yoo, 1980), with a few species in southern Africa, the tropical Indo-west Pacific and the western Americas (PONDER & Yoo, 1980), the Antarctic - sub-Antarctic (PONDER, 1983), and the eastern

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(**) Lavoro accettato il 31 ottobre 1988.

Atlantic-Mediterranean Sea (NORDSIECK, 1972; AMATI, 1987). The taxonomy of the European species of Cingulopsidae has been reviewed most recently by AMATI (1987), where he included six species in *Eatonina* (*Coriandria*), following the classification adopted by PONDER & YOO (1980) who figured the radulae and opercula of two European species. Whereas AMATI's species-level classification is essentially followed here, examination of three additional European species from the Mediterranean Sea shows that some changes in the generic classification are necessary.

Materials and methods

Specimens of *E. ochroleuca*, «*E.*» *micrometrica* and *E. pumila* from Calvi, Corsica were examined. These contained dried animals which were re-constituted with weak detergent. Radulae and opercula were mounted using the methods described by PONDER & YOO (1976). Representative specimens of the taxa studied in this work are housed in the Swedish Museum of Natural History Stockholm, the Muséum National d'Histoire Naturelle, Paris and the Australian Museum, Sydney.

Results

The radula (Fig. 1A-C) and operculum (Fig. 1D-E) of *E. ochroleuca* were examined and found to be typical of the subgenus *Eatonina* (see PONDER & YOO, 1980), this also being in accordance with the shell characters (Fig. 1F), including the colour pattern of axial flames and spots. MOOLENBEEK (1986) has recently described *Eatonina vermeuleni* from the Cape Verde Islands which shows a similar colour pattern and shell form to *E. ochroleuca* and is probably consubgeneric. This subgenus has previously only been recorded from Australasia, southern Africa and the tropical Indo-west Pacific.

Several specimens of «*Eatonina*» *micrometrica* were examined and found to lack a radula. The operculum (Fig. 2G, H) differs from that of species of *Eatonina* in being thinner and in having a very short peg (Fig. 2H) which does not protrude beyond the margin of the operculum. The shell (Fig. 2E, F) differs in having a weak swelling on the columella (Fig. 2F) and a thin, simple, prosocline outer lip. These characters are all typical of the genus *Tubbreva* PONDER, 1965, previously known from New Zealand [PONDER, 1965, as *Rufodardanula* (*Tubbreva*)], Eastern Australia (PONDER & YOO, 1980) and Hawaii (KAY, 1979, as *Rufodardanula*).

Three of the other species of *Eatonina* reviewed by AMATI (1987) are typical of the subgenus *Coriandria*. The radula and operculum of *E. (C.) cossurae* and *E. (C.) fulgida* have previously been figured [PONDER & YOO, 1980, fig. 11, h-j (*E. fulgida*), l-n (*E. cossurae*)] and those of *E. globulina* (= *pumila*) are illustrated here (Fig. 2B-D). Members of this subgenus have a markedly disjunct distribution, with the only known species other than those in the Mediterranean - eastern Atlantic (listed below) occurring in southern Australia (PONDER & YOO, 1980).

PONDER & YOO (1980) point out that *Setia globulina* MONTEROSATO, 1884, the type species of *Globisetia* NORDSIECK, 1972, is «virtually inseparable in shell characters from *Eatonina* (C.) *fulgida*». AMATI (1987) has listed this species as a synonym of *E. fulgida* on the basis of this statement. Examination of a photograph of a probable syntype of *S. globulina* in the British Museum (Nat. Hist.) (reg. no. 87021) shows that this taxon is probably a senior synonym of *E. pumila*, the latter name being published slightly later (see AMATI, 1987 for references).

Eatonina celata (MONTEROSATO), a species listed by AMATI (1987), but not figured by him, has not been examined in the course of this study.

Thus the modified classification of Northeastern Atlantic and Mediterranean species of Cingulopsidae can be summarized as follows:

Cingulopsidae

Genus *Eatonina* THIELE, 1912

Subgenus *Eatonina*

E. (E.) ochroleuca (BRUSINA, 1869)

E. (E.) vermeuleni Moolenbeek, 1986

Subgenus *Coriandria* TOMLIN, 1917

E. (C.) cossurae (CALCARA, 1841)

E. (C.) fulgida (J. ADAMS, 1797)

E. (C.) globulina (MONTEROSATO, 1884, before Sept.) [*Setia pumila* MONTEROSATO, 1884 (post. Sept.)]

E. (?C.) celata (MONTEROSATO, 1884)

Genus *Tubbreva* PONDER, 1965

T. micrometrica (SEGUENZA in ARADAS & BENOIT, 1876)

Discussion

The absence of *Tubbreva*, *Eatonina* s.s. and *Eatonina* (*Coriandria*) from the relatively well-collected and studied fauna of the western Atlantic and the presence of these genus-group taxa in the Indo-west Pacific and Australasia, as well as in the Mediterranean Sea, suggests that their current disjunct distribution may be a relict eastern Tethyan one. The closure of the connection between the Mediterranean Sea and the Indo-west Pacific through the Persian Gulf in the late Paleogene severed the previously continuous distributions of many taxa. These genus-group taxa must have been present in the eastern Atlantic in the Pliocene to have survived the drying of the Mediterranean in the late Pliocene. *Eatonina* (*Coriandria*) *fulgida* is common today in the eastern Atlantic and at least one species of *Eatonina* s.s. (*E. vermeuleni*) lives in the eastern Atlantic (in the Cape Verde Islands) but, to date, no species of *Tubbreva* have been recognised.

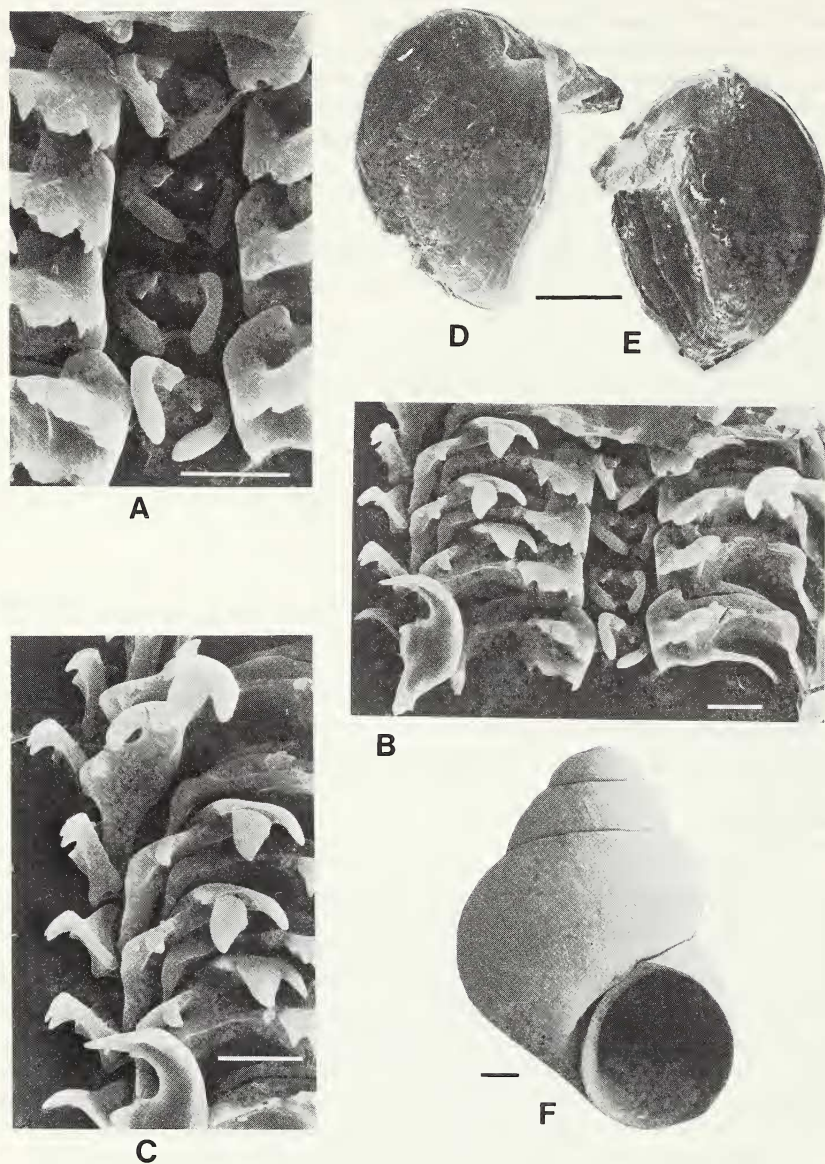


FIGURE 1.

Eatonina (Eatonina) ochroleuca (BRUSINA). Calvi, Corsica, on algae, 0-40 m. A-C. Radula (A detail of central teeth and inner parts of lateral teeth, C detail of lateral and marginal teeth). D, E. Operculum (D outer side, E inner side). F. Shell. Scales: A-C 0.01 mm; D-F 0.1 mm.

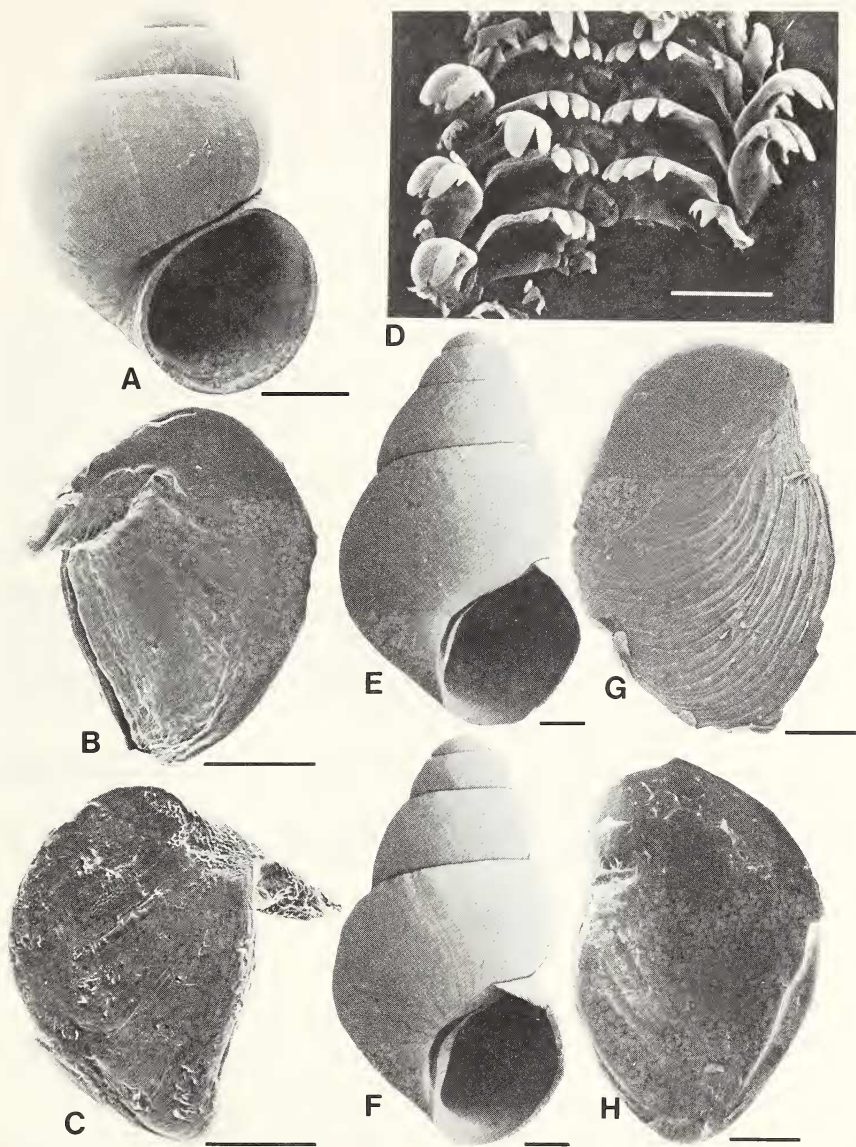


FIGURE 2.

A-D *Eatonina (Coriandria) globulina* (MONTEROSATO). Calvi, Corsica, on algae, 0-40 m. A. Shell. B, C. Operculum (B inner side, C outer side). D. Radula.

E-H. *Tubbrevia micrometrica* (SEGUEZZA in ARADAS & BENOIT). Calvi, Corsica, on algae, 0-40 m. E, F. Shell (F with outer lip broken back a little to show the weak swelling on the columella). G, H Operculum (G outer side, H inner side).

Scales: A 0.2 mm; B, C, E-F 0.1 mm; D 0.02 mm; G, H 0.05 mm.

Acknowledgements

The material used in this paper was loaned to me by Dr. A. Warén and is part of a large series of live-collected material obtained by him and Dr. P. Bouchet in Corsica in 1981. I gratefully acknowledge the assistance of Mr G. Avern who mounted and scanned the material used in this paper and Mr P. Colman who assisted with mounting the plates.

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